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EXAMINER

BREWSTER, WILLIAM M

ART UNIT PAPER NUMBER

2823

DATE MAILED: 07/30/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/058,854

Applicant(s)

HELLIG ET AL.

Examiner

William M. Brewster

Art Unit

2823

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 22 May 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 6,7,9 and 11-14 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 6,7,9 and 11-14 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 5.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Claim Objections***

Claims 9, 11 are objected to because of the following informalities: no antecedent arsenic implant or boron implant is made in claim 6. Appropriate correction is required.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim 14 is rejected under 35 U.S.C. 102(b) as being anticipated by Zhou, U.S. Patent No. 6,156,598.

Zhou, in fig. 3, anticipates a method of fabricating a semiconductor transistor comprising the steps of: in fig. 1, forming a gate structure 22 having a sidewall portion and a top portion, said gate structure formed on a substrate; in fig. 2, forming a dielectric spacer formed over the substrate, said dielectric spacer forming an L-shape comprising a vertical portion 47 parallel to the sidewall portion, and a horizontal portion 44 approximately orthogonal to the sidewall portion of the gate structure, in fig. 3, forming a source/drain extension 60 having an average extension depth, forming a first portion of a source/drain region, defined by the sharply curved profile between 60 and

62 having a first average depth and a first length; forming a second portion 62 of the source/drain region simultaneously in time with the first portion, wherein the second portion 62 has a second average depth and a second length, wherein the second average depth is greater than the first average depth, and the first average depth is greater than the average extension depth.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 6, 7, 12, 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al., U.S. Patent No. 5,679,589 in view of Guldi, U.S. Patent No. 5,576,230.

Lee teaches a method of fabricating a semiconductor transistor comprising the steps of: in fig. 2, providing a gate structure 17 having a sidewall portion and a top portion, said gate structure formed on a substrate 11; in fig. 3, limitations from claim 7: further including a step of forming a liner oxide 19 over said gate structure prior to the step of forming the dielectric spacer; forming a dielectric spacer formed over the substrate 21, in fig. 4, said dielectric spacer 21 forming an L-shape comprising a vertical portion parallel to the sidewall portion, and a horizontal portion approximately orthogonal to the sidewall portion of the gate structure; limitations from claim 12: the

method of Item 6 wherein said L-shaped dielectric spacer is a nitride, col. 2, lines 42 - 57; , limitations from claim 13: wherein the length of the horizontal portion of the L-shaped dielectric spacer ranges from about 200 Angstroms to about 500 angstroms, col. 2, lines 42 - 57; in fig. 6, forming a first source/drain region 33 & 35, in the substrate using an implant species 37, wherein the first source/drain region formed underneath the horizontal portion of the L-shaped dielectric spacer; and forming a second source/drain region 25 & 27, in the substrate using the implant species, wherein the second source/drain region is immediately adjacent the first source, drain region and has a depth greater than a depth of the first source/drain region.

Lee does not specify any one particular doping species, leaving the user to decide which she prefers. Guldi teaches using antimony. Guldi, in fig. 8 forms a transistor comprising a substrate 12, gate structure 24, a dielectric spacer 26, and forming source/drain regions 54 with an implant species selected from the group of indium and antimony: antimony, col. 7, lines 1-20. Guldi gives motivation in col. 1, line 63, col. 2, line 25. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to recognize that combining Guldi's process with Lee's invention would have been beneficial because it helps to reduce extended dislocations in self-aligned implanted regions.

Claims 9, 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee in view of Guldi as applied to claims 6, 7, 12, 13 above, and further in view of Chen et al., U.S. Patent No. 6,074,915.

Lee and Chen do not specify the conditions for implanting, but Chen does. Chen in fig. 3H, forms a gate structure 165 having a sidewall portion and a top portion, said gate structure formed on a substrate; forming a dielectric spacer 180 formed over the substrate, forming a source/drain region by ion implanting As or BF<sub>2</sub> at an ion dose in the range of  $1 \times 10^{15}$  to  $5 \times 10^{15}$  ions/cm<sup>2</sup>, at an energy of between about 10 to 50 keV. Chen gives motivation in col. 4, line 16 - 24. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to recognize that combining Chen's process with Lee's invention would have been beneficial because it helps produce a salicide and SAC structures with a single masking step.

### ***Response to Arguments***

Applicant's arguments with respect to all claims have been considered but are moot in view of the new ground(s) of rejection.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to William M. Brewster whose telephone number is 703-305-5906. The examiner can normally be reached on Full Time.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 703-306-2794. The fax phone numbers for the organization where this application or proceeding is assigned are 703-305-3432 for regular communications and 703-305-3432 for After Final communications.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

*William M. Brewster*

WB

July 11, 2003